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THE ADVANCEMENT OF SCIENCE.

We cordially congratulate the managers of the American ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE, on the very thorough success which has attended its twenty-ninth annual meeting, held last week at Boston.

We have in this issue devoted nearly the whole of our space to chronicling its proceedings, and we draw special attention to the masterly address of the retiring President, Professor George F. Barker, which we present in full.

The address of welcome delivered by the venerable Professor William B. Rogers, L. L. D., will also be read with interest; he traces the history of the Association from its cradle, when it was called the Association of American Naturalists and Geologists, to its high position at this moment, when, as he hopefully said, it may be even fairly on its way to overtake the BRITISH ASSOCIATION, which has a roll of membership of 3,500 persons, and an income of $12,500, and at the same time 1,000 life members.

The success of the present meeting, and the addition of nearly six hundred new members, would seem to warrant the most brilliant anticipations for the future of the Association; and if its members follow the excellent advice of Professor Rogers, and do whatever is in their power to "quicken scientific thought, to accumulate scientific facts and investigate scientific laws," and generally to advance science, the result must elevate this Association to a position second to no other in the civilized world.

We are also reminded by Professor Rogers that while the chief function of the Association is to advance the progress of science; the term advancement necessarily implies diffusion, it would, therefore, appear an appropriate moment to speak of the value of this Journal in this connection. In addition to our report in this issue the addresses of Professor Hall, of Washington, and Professor Agassiz will be published in full. Of the two hundred and eighty papers read before the Association, some will be published by us *verbatim*, commencing next week with that of Mr. Alexander Graham Bell on his new instrument, the Photophone, illustrated with twelve drawings, placed at our disposal by Mr. Bell; and of the other papers, we hope to give extracts of the most important.

If, then, the advancement of science necessarily implies its diffusion, we may, with justice, claim for this journal some credit in the great work, as Professor Rogers said, in sowing the seeds of science as widely as possible through the world, waking up in all quarters those latent spirits, whose inborn talent and tendencies will hereafter blossom and fructify in scientific results.

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

The twenty-ninth meeting of this Association met at Boston, Mass., on the 25th of last month, under the presidency of Professor Lewis H. Morgan, of Rochester, N. Y.

Professor George F. Barker having called the meeting to order, and introduced the President elect, the proceedings commenced by an address of welcome from Professor William B. Rogers, L. L. D., President of the Massachusetts Institute of Technology. After a few preliminary remarks, Professor Rogers continued as follows:

The American Association for the Advancement of Science has never yet held a meeting in this city of Franklin, and I may say, also, the city of Bowditch, not to mention the long line of other scientific worthies, prominent among whom is our great instructor, our adopted citizen, Louis Agassiz. It seems a fitting place for such an association to convene. Its spirit, its institutions, its history, its habits and sympathies, all favor such a reunion between its citizens and the advocates and votaries of science. It was my good fortune, if it is a good fortune of any man to be able to date back his life for a long period of years, to have been familiar with the cradle of this institution in the form in which it first presented itself as the Association of American Naturalists and Geologists. This, however, was not by any means the earliest congress of science assembled in the world. The origination of this thought of a parliamentary annual meeting of scientific men seems properly to belong to a great German philosopher and speculator (?), who as early as 1822 organized the German Association for the Advancement of Science. For eight or nine years this example was not followed, but in 1831 Brewster, aided by Brougham, established the great British Association for the Advancement of Science, which we are to regard as the parent institution from which we have sprung. This British association, meeting in the ancient city of York in 1831, had its annual assemblings for a series of years in all the great capitals and some of the secondary cities in Great Britain. Faithfully administering to the needs and stimulating the energies of scientific inquiry, and publishing its annual solid quarto, which is a library representing the progress of physical and natural science of that time comparable to any that can be presented on the shelves of any collection of books in the world. Now this British association is holding to-day its fiftieth annual meeting; and now, in the afternoon of its assembling, I can imagine clearly in my mind's eye some of those great dignitaries of science that are there assembled. I can think of Sir Joseph Hooker, of Sir William Thomson, of Huxley, of Tyndal, of Balfour Stewart, and of all the great worthies that illustrate physical, mathematical and natural science for the last generation; and as I look back on the records preceding

the present year from the commencement of the association in Great Britain till this time, I find the chair of the presidency of that institution. as well as all the official characters connected with it, men who are or have been eminent for their promotion of scientific truths. I trust to-day before we shall have closed our assembling there will be transmitted by the cable a vote of greeting from the American Association of Science assembled here to the British association now assembled at Swansea.

Soon after this there came our American Association of Materialists and Geologists. I look around me and I think of the history of that active band of scientific workers, when all our State surveys were in their earlier states, when our geology, palcontology, our natural history in fact, in general was in a comparatively unexplored condition, and I feel saddened that I am the only member of the presidents of that early institution except one who has been, so far as intellectual laws are concerned, entirely removed from all association with scientific men. In the year 1847, during my presidency of this smaller institution, the plan was organized for a more extended and comprehensive form of social organization for the advancement of science; and in the year 1848, under the presidency of Mr. Redfield of New York, the first meeting of this enlarged association as it now exists was held in the city of Philadelphia. Since that time, consecutively year by year, this Association has assembled, save only during that dark period when, through most sad necessities, unfortunate circumstances and dreadful commissions, this association was compelled to hold its peace. But since 1865 the Association, with renewed vigor, has been prosecuting its work, and now we are assembled for the twenty-eighth time at an annual meeting to carry on this active labor of scientific instruction.

Now, what are the functions of such an Association? Its title tells. It is an association for the advancement of science, and it is expected and required of all those who become its members that they shall do whatever is in their power to quicken scientific thought, to accumulate scientific facts, to investigate scientific laws, or, in other words, to advance the progress of science throughout the world. But this term advancement necessarily implies diffusion, and while it is an association for the advancement of science it is no less an association for its diffusion, and this justifies in the highest degree the comparatively popular character of the meetings of the American Association. How can we best advance science but by sowing the seeds of science as widely as possible through the world, wakening up in all quarters where the association assembles those latent spirits, those unborn talents and tendencies which will hereafter blossom and fructify in scientific results. Thus it is, then, gentlemen, that we have our association assemblies here, and while I would not compare it as yet in point of numbers, in point of strength with the parent association in Great Britain, I see here to-day and hear from all quarters amongst those who are connected with the working operations of this meeting the enormous increase which is promised this association in its future growth. Let us think for a moment. For the last twenty years the British Association has had an average number on its rolls of members of all classes of 3,500; it has had an average attendance of nearly 2,500; it has had an average income from its members of $12,500, having at the same time 1,000 life members, and being able, practically and actively, to promote scientific research by the bestowal of grants for different departments of inquiry of a sum amounting of from $5,000 to $10,000 a year. Now, gentlemen of the Association and citizens of Boston, here is something for us to emulate. Here is a direction of progress in which we can be sustained by the strong and hearty approval, nay, the applause, of all scholarly and scientific men throughout the world. And, from what I have learned to-day, I do not doubt that the American Association of Science is fairly in the way to overtake the great association which is now assembled at Swansea, in regard to its numbers and its resources. And, as to the character of the works that are presented, of course in all such exercises the materials that are gathered together are of various qualities as well as shapes and dimensions. Let us now make it our special work to exclude from our annual reports all detailed publications which are not of a character actually to add to the stock of human knowledge, whether that knowledge be simply the gathering together of facts by careful processes of discernment, or the development of laws by careful mathematical investigation And, therefore, let it be our work, as I trust it will be, and has been already, in fact, suggested by our secretary, that these prolonged discussions, which, however valuable in the main they may be or not of the quality and character to belong to the transactions of a great body like this, shall be presented in small type and in abstract in the latter part of the volume.

I thank my friends for the patience with which they have listened to one who does not like to call himself an old man, but who still finds something of the sentiment of the war-worn soldier who likes always, if he have a kindly audience, to shoulder his crutch and fight his battles o'er again. [Applause.] If I have taken too much of your time I beg your pardon. As I have spoken in behalf of this committee of the city of Boston, let me conclude with my personal welcome in behalf of this institution, over which I have the honor to preside, and to say to you that the corporation and officers of the Institute of Technology are not only glad but they are proud to welcome the American Association for the Advancement of Science into this hall and to all the accommodations and comforts which it can offer.

The Mayor of Boston, the Hon. Frederick O. Prince, then addressed a few words of welcome, and was followed by His Excellency Governor Long, who delivered an additional address for the same purpose.

The response of President Morgan, on behalf of the Association, was as follows:

MR. CHAIRMAN:—The Association has listened with much pleasure to your address of welcome to the city of Boston. In no other city of our land are better appreciated the unity of the sciences and the brotherhood of scientific men. These are central ideas of this Association, and when we meet among a people whose hospitality is vitalized by intelligent sympathy, a powerful impulse is given to the work which it was designed to promote. I venture to predict, sir, that this meeting will become memorable in our history. It may seem singular that this session of the Association should be the first one held in the good city of Boston, during the long series of twenty-nine annual meetings. It has, however, met at Cambridge, which in the public eye is a part of Boston. We cannot and we ought not to separate Cambridge, with its noble university and its distinguished body of teachers, from Boston, in which the roots of Cambridge are planted. They are "one and inseparable" in association as in fame. Thus we are enabled to say that this Association is indebted to Boston for a peerless cluster of presidents: The illustrious and lamented Agassiz, to whom American science is so deeply indebted; the learned and gentle Wyman, whose loss we still mourn; these have ceased from among us, and their departure has rounded and completed their fame. Rogers, Peirce, Gould, Gray, Lovering yet remain with us, and, therefore, we cannot on this occasion speak of them as their distinction deserves. "*Seri in cælum redeatis.*"

Mr. Mayor:—The American Association for the Advancement of Science is popular in its character, as it should be. Investigators in all departments of science are cordially welcomed to its membership. By this free intercourse of persons engaged in scientific pursuits, results of the highest importance are constantly attained. When the meetings of this Association become indifferent to the communities among which they are held, its usefulness will be near its end. There is a direct connection between the work upon which its members are engaged and the material prosperity of the country, in which all alike have an interest. Scientific investigations ascertain and establish principles which inventive genius then utilizes for the common benefit. We cannot have a great nation without a great development of the industrial arts, and this, in its turn, depends upon the results of scientific discovery as necessary antecedents. Material development, therefore, is intimately related to progress in science.

Your Excellency, Governor of the Commonwealth of Massachusetts:—Without intending to depart from the proprieties of the occasion, it may be proper to say, that

those of us who come from beyond the Hudson can but feel that in entering New England we reach the birthplace of American institutions. To some of us it is the land of our fathers, and we cannot approach the precincts of their departed presence without the sentiment of filial veneration. Here they laid, broad and deep, the foundations of American freedom, without which American science would have been an infant in leading strings to-day.

Mr. Chairman and Gentlemen :—With a grateful appreciation of the kindness of the people of Boston, the Association is now prepared to enter upon the regular work of the session.

GENERAL BUSINESS.

The association then proceeded to routine business. The permanent secretary gave notice that the following members of the assocation had died since the last meeting, viz.:

George W. Abbe, of New York, died September 25, 1879.
E. B. Andrews, Lancaster, Ohio.
Homer C. Blake, New York.
F. A. Cairns, New York.
Caleb Cook, Salem, Mass., died June 5, 1880.
Benjamin F. Mudge, Manhattan, Kansas, died November 21, 1879.
Thomas Nicholson, New Orleans, La.
Louis François de Pourtales, Cambridge, Mass., died July 18, 1880.

The financial report, presented by the secretary, showed for the first time since he has been in office a balance in favor of the sssociation. The total receipts during the year were $5430.35, principally from assessments and entrance fees. The disbursements were: Expenses of the Saratoga meeting, $189.82 ; publication of 1250 copies of proceedings of Saratoga meeting, $2142.64 ; salaries of permanent and assistanf secretaries, $1396. The balance in hand was $148.-24. The life membership fund amounted to $975.77.

The standing committee was then completed, and includes, besides the officers of the association, the following fellows: N. T. Lupton, F. W. Clarke, E. T. Cox, W. Harkness, O. T. Mason and S. A. Lattimore.

On motion from the floor, a standing committee was appointed by the president to prepare a message of greeting to the British Association, to be sent by cable. Professor W. B. Rogers, Asa Gray and N. T. Lapton were appointed, and sent the following despatch: "The American Association for the Advancement of Science, in session in Boston, sends cordial greetings to the British Association at Swansea, on the occasion of its fiftieth meeting."

The president was requested to appoint a committee of three to propose suitable resolutions of regret at the death of the late General Albert J. Moyer, of the United States Signal Service.

Over four hundred ladies and gentlemen were elected members of the association.

It was voted that, with the exception of Thursday, the morning session begin at ten o'clock and close at one o'clock; and that the afternoon session begin at 2:30 o'clock and close at five o'clock. The general session then adjourned.

The Sections then organized. Section A was called to order in Huntington Hall. Professors A. W. Wright, A. M. Mayer and John Trowbridge were elected the committee to coöperate with the Vice President and Secretary of the Section, and the Chairmen and Secretaries of the Sub-Sections. F. H. Smith, A. E. Dolbear, J. M. Van Vleck and Thomas Hill were chosen on the nominating committee, which acts with the standing committee in the selection of officers for next year. The Section then adjourned. Alexander Agassiz presided at the meeting of Section B. G. L. Goodale, E. D. Cope and B. G. Wilder were chosen the sectional committee, and C. S. Minot, A. J. Cook, W. G. Farlow and Thomas Mahon, nominating committee. On motion of Dr. Minot, it was voted to form a Permanent Section of Biology. The Section then adjourned to Friday. In the afternoon Mr. Asaph Hall gave the Vice President's address of Section A at half-past two; Professor J. M. Ordway read the Chairman's address to the Sub-Section of Chemistry at four; at the same time Major J. W. Powell pronounced the Chairman's address before the Anthropological Section, while the official address in microscopy was admitted. The Entomological Club met at five o'clock, Mr. A. R. Grote in the chair. A communication from W. H. Edwards was presented; Mr. McCook concluded his comment on the honey ant; Mr. A. J. Cook offered some comment; Mr. E. P. Austin exhibited plates; an essay from S. A. Forbes was read, and Dr. G. F. Waters discussed it. In the evening the retiring President pronounced his great oration on life as a problem of chemistry and physics.

THURSDAY, AUGUST 27TH.

The second day of the meeting was spent by the American Association in Cambridge. At eleven o'clock an audience of nine hundred assembled in the Sanders Theatre to listen to the eulogy by Professor Alfred M. Mayer upon the late Joseph Henry, and to the annual address by Professor A. Agassiz before the natural history section. The audience included nearly all the members of the Association registered this year, with the addition of a large number from Cambridge. The Harvard professors are usually absent during the summer vacation, but on this occasion nearly the entire scientific faculty were present to receive and honor their friends and guests. At the short business meeting of the general session twenty new members were admitted to the Association, and the following resolution, offered by Dr. L. C. Le Conte, referred to a standing committee: "Resolved, that the constitution and by-laws be so amended as to establish a Section C of biology, with an organization similar to that of the two existing sections." After the addresses at the theatre dinner was served in Memorial hall, Mr. Martin Brimmer presiding, but made no remarks and gave no toasts. After dinner the ladies and gentlemen visited the scientific collections, especially the two museums, the mineralogical cabinet, the physical laboratory, the library and the historic points of Cambridge. At four o'clock the visitors gathered in about equal numbers at the botanic garden, the observatory and the house of Mrs. T. P. James. At the garden Professor Asa Gray spoke on the characteristics and distribution of the Rocky Mountain vegetation. Professor E. C. Pickering, the director, offered an opportunity for inspecting the observatory, while Mrs. James entertained those interested in keramics. In the evening there was a reception at Mr. and Mrs. A. Graham Bell's residence.

FRIDAY, AUGUST 28TH.

Little routine was required to be transacted, and the sections and sub-sections settled down to steady work. It was announced that so far nine hundred ladies and gentlemen had entered their names for membership, and that the attendance was a hundred-fold more than was usually present on former occasions.

Among the more important papers read were :

"Determination of the routine time of Jupiter, from observations of the red spot in 1879-80; together with the physical character and changes of the spot," by H. S. Pritchett.

"Determination of the comparative dimensions of the ultimate molecules, and deduction of the specific properties of substances," W. N. Norton.

"Friction of lubricating oils," C. J. Woodbury.

"Steady and vortex motions in vis-cous incompressible fluids," Thomas Craig.

"Spectroscopic notes," C. A. Young.

"Discussion of the phenomena observed in comparing the spectrum of the light from the limbs with that from the centre of the solar disk," C. S. Hastings.

"Maxima and minima tide predicting machine," W. Ferrel.

"Methods in use at the Observatory at Yale for the verification of thermometers and testing of time pieces," Leonard Waldo.

"Heat produced by magnetizing and demagnetizing iron and steel," John Trowbridge.

"Lecture experiments for the direct determination of the velocity of sound," W. A. Anthony.

"On the refractive index of metallic silver," Arthur W. Wright.

"On a form of vacuum tube for spectroscopic works," Arthur W. Wright.

"Progress made at the Observatory of Harvard College in the determination of the absolute coördinates of 109 fundumental stars;" "A simple and expeditious method of investigating all the division errors of a meridian circle;" "The systematic errors of the Greenwich right ascensions of southern stars observed between 1816 and 1831; "Preliminany determination of the equation between the British imperial standard yard and the metre of the archives;" "The probable error of a single observation at sea,

deduced from the observations of W. H. Bacon, Cunard steamer Scythia," all by W. A. Rogers.

CHEMISTRY.

Rotary power of glucose and grape sugar—H. W. Wiley.
Actinism—A. R. Leeds.
The occurrence of oxide of antimony in extensive lodes in Sonora—Mexico.
Convenient scale and apparatus in gas analysis—E. W. Morley.
On the constitution of tartrates of antimony—F. W. Clarke.
Action of sunlight on glass—Thomas Gaffield.
Near ratio of oxygen to nitrogen in the atmosphere—E. W. Morley.

SUBSECTION MICROSCOPY.

"Microscopic studies in Central Florida," C. C. Merriam; "The errors of a few English, French and American stage micrometers," William A. Rogers; "Apparatus used in photographing microscopical objects." Samuel Wells; "A new freezing microtome," William Hailes; "Microscopical investigations of the Havana yellow fever," George M. Sternberg; "Permanent microscopic preparations of Amphibian blood corpuscles," S. H. Gage; "Permanent microscopic preparations of Plasmodium," S. H. Gage.

BIOLOGY.

"Comparative anatomy as a part of the medical curriculum," Harrison Allen; "Distinguishing species of Populus and Juglans by the young naked branches," W. J. Beal; "Observations on Japanese Brachiopoda," E. S. Morse; "An investigation of the yellow fevers," B. D. Halsted; "Incomplete adaptation as illustrated by the history of sex in plants," L. F. Ward; "Evolution of parasitic plants," Thomas Meehan; "Anthrax of fruit trees, or the so-called fire-blight of the pear and twig-blight of the apple tree," T. J. Burrill; "Further notes on the pollination of Yucca, and on Pronuba and Prodoxus," C. V. Riley; "Fossil Dinocerata in the E. M. Museum at Princeton, N. J.," F. C. Hill; "Origin and Succession of Felidæ," E. D. Cope; "Preservation of fossil insects and plants at Malon Creek," J. W. Pike; "Menobranchus lateralis," P. R. Hoy.

GEOLOGY.

Before the geologists were presented ten essays; "The Cupriferous series in Minnesota," N. H. Winchell; "The excavation of the upper basin and clove of the Kaaterskill, Catskill Mountains, N. Y.," Alexis A. Julian; "Progress of geological investigation in New Brunswick, 1870–1880," L. W. Bailey; "The tertiary age of the iron ores of the lower silurian limestone valleys," H. C. Lewis; "Note on the Turquoise localities of Los Cerillos," B. Silliman; "Los Cerillos, New Mexico, an area of recent eruptive rocks with mineral veins," B. Silliman; "Iron mines of Ore Hill, Conn., and vicinity, and the making of pig iron," W. A. Stearns; "Law of land forming on our globe," Richard Owen; "Kames and eskors in Maine," George H. Stone; "Occurrence of tin ore at Winslow, Me.," C. H. Hitchcock.

ANTHROPOLOGY.

The anthropologists met to listen to the following essays: "Ethnology of Africa, illustrated by a large manuscript map," A. S. Bickmore; "Myths and folk lore of the Iroquois," Erminnie A. Smith; "Prehistoric altars of Whiteside county, Illinois," W. C. Holbrook; "Theory of primitive democracy in the Alps," D. W. Ross; "Ancient mounds in the vicinity of Naples, Illinois, Pt. II. Illustrated with skulls, pipes, copper axes, bone implements and other articles from the mounds," J. G. Henderson; "The mounds of Illinois," William McAdams; "Prehistoric and early types of Japanese pottery," E. S. Morse.

In the evening Mr. Alexander Graham Bell brought before the Association his recent discovery of the Photophone, and researches with Mr. Sumner Tainter in the production and reproduction of sound by means of light.

SATURDAY, AUGUST 28TH.

In general session a few new members were elected, and on motion of Professor Ormond Stone, the standing committee of the Association was instructed to refer the subject of standard time to a special committee. In section A a sub-section H of mathematics and astronomy was organized with Mr. Simon Newcomb, of Washington, as chairman, and Mr. Winslow Upton, of Washington, as Secretary.

The following papers were also read in the various sections and bi-sections.

PHYSICS.

"On the present condition of musical pitch in Boston and vicinity," Charles R. Cross and William T. Miller; "The Co-efficient of expansion of gas solutions," from the Messrs. E. L. Nichols and A. W. Wheeler, and "The new action of magnetism on a permanent electric current," by Mr. E. H. Hall; the latter being among the most important papers, theoretically considered, ever contributed by an American to the science of physics. Then came "A simple device for projecting vibrations of a liquid film without a lens," by H. S. Carhart; "Observations on some recent hail-storms in North Carolina," by J. R. Blake; and "Results of a magnetic survey of Missouri," by Francis E. Nipher.

MATHEMATICS AND ASTRONOMY.

"The solar parallax for meridian observation of Mars in 1877," by J. R. Eastman; "A note on zodiacal light," by H. C. Lewis, and a "Tidal theory of the forms of comets."

CHEMISTRY.

"On a solution of ferric gallate and ferric oxalate as a reagent for quantitive analysis of ammonia," N. B. Webster.
"Description of new substituted acrylic acids," C. F. Malberry.
"The valuation of indigo," L. M. Norton.
"The soil supply of nitrogen for plants," W. O. Atwater.
"Incrustations formed in pipes used in gas wells," H. L. Nason.
"A modification of Bertier's process for the valuation of coal," Charles E. Monroe.
"Observation on the temperature and chemical character of Mystic Lake, Mass," W. R. Nichols.

MICROSCOPY.

"On the limits of visibility with the microscope," A. E. Dolhear.
"Minute anatomy of the human Larynx," Carl Seiler.
"Infusoria found in fresh ponds," S. P. Sharples.

NATURAL HISTORY.

"Endo-cranium and the maxillary suspensorium of the bee," G. Macloskie.
"Tongue in snakes and birds," C. S. Minot.
The age of the copper bearing rocks of Lake Superior, M. E. Wadsworth.
Structure and nomenclature of the brain, with special reference to that of the cat, Burt. G. Wilder (three papers).
Plan of the cerebro-spinal nervous system, S. V. Clevenger.

ANTHROPOLOGY.

Aboriginal pottery and stone implements, S. S. Holdeman.
Rude argillite implements, C. C. Abbott.
The Dacotah tribes, H. B. Carrujton.
Discoveries in the Mammoth, Wyandot and Luray caves, H. C. Hovey.

We propose to offer the readers of SCIENCE verbatim reports of the principal addresses, and lengthy abstracts of the leading papers, read before this important meeting of the Association, and will commence the series with that of the

ADDRESS OF PROFESSOR GEORGE F. BARKER, THE RETIRING PRESIDENT OF THE ASSOCIATION.

SOME MODERN ASPECTS OF THE LIFE QUESTION.

The number of roots in our equation of life increases the difficulty of solving it, but by no means permits the acceptance of the lazy assumption that it is altogether insoluble or reduces a sagacious guess to the level of the prophecy of a quack.—HAUGHTON.

LADIES AND GENTLEMEN OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

The discovery of new truth is the grand object of scientific work. The exultation of feeling which comes from the possession of a fact, which, now, for the first time, he makes known to men, must ever be the reward of the scientific worker. As investigators and as students of science we are met here to-day at this our annnual session. Each of us during the past year has been endeavoring to push outward further into the unknown, the boundary of present knowledge. When, therefore, we thus meet together it is fitting that, from time to time, our attention should be called to the progress which has been made along some one of the various lines of research, and to the milestones which mark the epoch of advance along the way which science has traveled. Moreover, we may profitably sum up at such times the work done in particular directions, and encourage ourselves with prospective and retrospective glances. In these summings up, however, a difficulty arises. The range of modern scientific thought includes an immense area. The field of knowledge is already so vast, that, seen from the vertical distance necessary to make a wide survey, that small portion of it which is familiar to any one individual is scarcely visible. In consequence, to use a mechanical figure, the solid contents of a man's acquirements being given, the depth thereof is inversely as the area covered. He, therefore, who undertakes to speak even for one single department of science distributes his stock of knowledge